

AD-A169 840

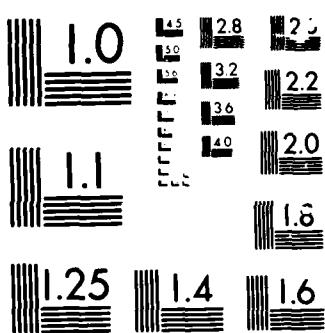
AUTEC OCEAN HAULDOWN DIVE SURVEY SITE 1 AND SITE 2(U)
TRACOR/MARINE INC FORT LAUDERDALE FL 31 AUG 83
CHES/NAVFAC-FPO-8361 N00600-81-D-5278

1/1

UNCLASSIFIED

F/G 8/10

NL



FPO
8361



AD-A169 040

DTIC FILE COPY

DTIC
ELECTE
S JUN 13 1986
D

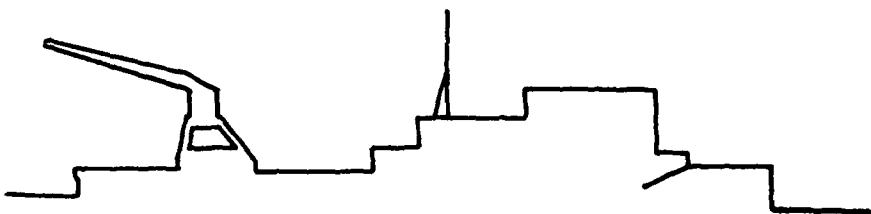
FPO 8361

OFFICE SYM 7a. NAME OF MONITOR
Ocean Engineering
& Construction
Project Office
CHESNAVFACENGCOM

Zip Code) 7b. ADDRESS (City, S
BLDG. 212, Washington
Washington, D.C. 2

OFFICE SYM 9. PROCUREMENT INSTN
N00600-81-D-5270

10. SOURCE OF FUNDS



Ocean Engineering

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON NAVY YARD
WASHINGTON, DC 20374

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

86 6 12 127

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENT

1a. REPORT SECURITY CLASSIFICATION

Unclassified

2a. SECURITY CLASSIFICATION AUTHORITY

3. DISTRIBUTION AVAILABILITY OF REP.

Approved for public release:
distribution is unlimited

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

4. PERFORMING ORGANIZATION REPORT NUMBER

5. MONITORING ORGANIZATION REPORT #
FPO 8361

6a. NAME OF PERFORM. ORG. 6b. OFFICE SYM
Tracor Marine, Inc.

7a. NAME OF MONITORING ORGANIZATION
Ocean Engineering
& Construction
Project Office
CHESNAVFACENGCOM

6c. ADDRESS (City, State, and Zip Code)

7b. ADDRESS (City, State, and Zip)
BLDG. 212, Washington Navy Yard
Washington, D.C. 20374-2121

8a. NAME OF FUNDING ORG. 8b. OFFICE SYM

9. PROCUREMENT INSTRUMENT IDENT #
N00600-81-D-5270

8c. ADDRESS (City, State & Zip)

10. SOURCE OF FUNDING NUMBERS
PROGRAM PROJECT TASK WORK UNIT
ELEMENT # # # ACCESS #

11. TITLE (Including Security Classification)

AUTEC Ocean Hauldown Dive Survey Site 1 & Site 2

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT 13b. TIME COVERED 14. DATE OF REP. (YYMMDD) 15. PAGES
FROM TO 83-08-31 41

16. SUPPLEMENTARY NOTATION

17. COSATI CODES
FIELD GROUP SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if nec.)
Atlantic Undersea Test & Evaluation Center,
Surveying, Oceanography, Diving

19. ABSTRACT (Continue on reverse if necessary & identify by block number)
Tracor Marine was tasked by Chesapeake Division Naval Engineering Command to
perform a dive survey in areas off AUTEC Sites 1 and 2 at Andros Island,
Bahamas. The survey was requested by Naval Underwater Systems Command (NUSC),
Newport to evaluate the existing bottom conditions at specific Site 1 (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT 21. ABSTRACT SECURITY CLASSIFICATION
SAME AS RPT.

22a. NAME OF RESPONSIBLE INDIVIDUAL

22b. TELEPHONE 22c. OFFICE SYMBOL

Jacqueline B. Riley

202-433-3881

DD FORM 1473. 84MAR

SECURITY CLASSIFICATION OF THIS PAGE

AD-A169 040

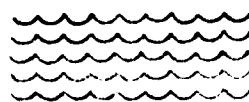
NGS

BLOCK 19 (Con't)

and Site 2 locations previously marked by reference buoys. The topographic information was required in order to determine a location for the proposed ocean hauldown facility. Ideally, such a location would be in depths of approximately 40 feet with flat terrain and free of large obstructions.

Information required by NUSC at Site 1 and Site 2 during the dive survey included bottom types, depths, possible platform locations, locations of obstruction, and possible cable routes through the reef line to shore.

Tracor Marine



1

Final Report
AUTEC Ocean Hauldown Dive Survey
Site 1 & Site 2

Submitted to:
NAVAL FACILITIES ENGINEERING
COMMAND

By
TRACOR MARINE, INC.

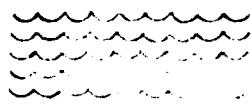
31 August 1983

DTIC
SELECTED
S JUN 13 1986 D
D

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

Tracor Marine



Final Report
AUTEC Ocean Hauldown Dive Survey
Site 1 & Site 2

Submitted to:
NAVAL FACILITIES ENGINEERING COMMAND
Building 200
Washington Navy Yard
Washington, D.C. 20374

Contract Number
N00600-81-D-5270

TRACOR MARINE, INC.
Job Number 723511

31 August 1983

Approved Edward Clausner
Edward Clausner
Vice President

Tracor Marine



DIVE SURVEY FOR OCEAN HAULDOWN

Site 1 & Site 2

TABLE OF CONTENTS

- 1.0 OVERVIEW
- 2.0 SURVEY DATA SITE 1
 - 2.1 Scope
 - 2.2 Results
- 3.0 SURVEY DATA SITE 2
 - 3.1 Scope
 - 3.2 Results
- 4.0 CONCLUSION
- 5.0 PERSONNEL
- 6.0 GENERAL LOG
- 7.0 DIVE EQUIPMENT AND MATERIAL
- 8.0 PHOTOGRAPHS

Tracor Marine



1.0

OVERVIEW

Tracor Marine was tasked by Chesapeake Division Naval Engineering Command to perform a dive survey in areas off AUTEC Sites 1 and 2 at Andros Island, Bahamas. The survey was requested by Naval Underwater Systems Command (NUSC), Newport to evaluate the existing bottom conditions at specific Site 1 and Site 2 locations previously marked by reference buoys. The topographic information was required in order to determine a location for the proposed ocean hauldown facility. Ideally, such a location would be in depths of approximately 40 feet with flat terrain and free of large obstructions.

Information required by NUSC at Site 1 and Site 2 during the dive survey included bottom types, depths, possible platform locations, locations of obstruction, and possible cable routes through the reef line to shore.

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	



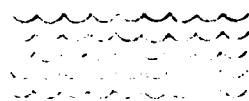
2.0 SURVEY DATE SITE 12.1 Scope

The Site 1 dive survey was conducted at an area outside the shallow reef approximately 0.5 miles north of the Site 1 seabuoy. The area was marked with a surface reference buoy at Latitude $24^{\circ} 43' 43.2403''$ N, Longitude $77^{\circ} 45' 39.9693'$ W. The location of the reference buoy in 40 feet of water was determined from Trisponder information obtained during an earlier bathymetric survey at Site 1 on 7 August, 1983.

The survey was conducted on August 21 and 22 from Zodiac inflatable boats with motors. Three scuba divers were used to perform this survey. Small marker buoys were placed to indicate areas of interest.

A theodolite positioning team from RCA-West Palm Beach was used at the completion of the survey to determine positions of the small marker buoys for future reference. This team used existing control points at Site 1.

The expected position of the reference buoy was confirmed by the theodolite positioning team on August 22 and its position



is shown in Figure 2-1. (Reference buoy anchor chain was wrapped around coral head). The survey in the vicinity of the buoy indicated several areas of interest and small marker buoys numbered 3, 7, 2, 1, and 5 were placed to delineate these areas.

Figure 2-2 is a bottom-type chart generated from information gathered during the survey. The bottom directly east or seaward of the reference buoy is characterized by a spur and groove coral formation running east and west for approximately 50 feet. The sand trenches (grooves) have a general depth of 40 feet and the coral spurs have a relief of 4 to 6 feet. The coral spurs diminish seaward to a sand area 75 feet wide which parallels the coral line and sweeps back toward the shoreline. There is no coral in this sand area. The sand is approximately 14" thick over a coral hard ground and the depth is approximately 50 feet. Buoy #7 is located on the east side of this sand area and buoy #3 is located on the western side.

A coral bottom is again present for approximately 20 feet from buoy #7 seaward, with the normal 4 to 6 foot relief. The depth of water in this area is 55 feet.



Buoys #1 and 2 mark an area of sand of approximately 40 feet in length and at a water depth of 65 feet.

Further seaward, the sand fades into a coral bottom with a slight rise at the 65 foot depth and then falls off to approximately 80 feet with a fairly gentle slope.

Continuing seaward, the slope becomes more pronounced and the bottom drops to 110 feet. Here the slope becomes fairly steep 45° and drops to 145 feet. At this point, the bottom slope is much more pronounced and drops on off to the floor at TOTO (Approximately 80° slope).

Buoy # 5 marks an outcroping which was teaming with fish and may be an outflow of water from an underground source.

Buoys #10 and 11 were placed in a shallow reef cut to define a possible cable route to shore which is shown as a dashed line on Figure 2-1. They are located in approximately 10 feet of water with coral and sand bottom. The relief is approximately 2-3 feet and clear of obstructions to shore.

Figure 2-3 gives lat/long of all buoys placed at site one plus buoy depth and bottom description.

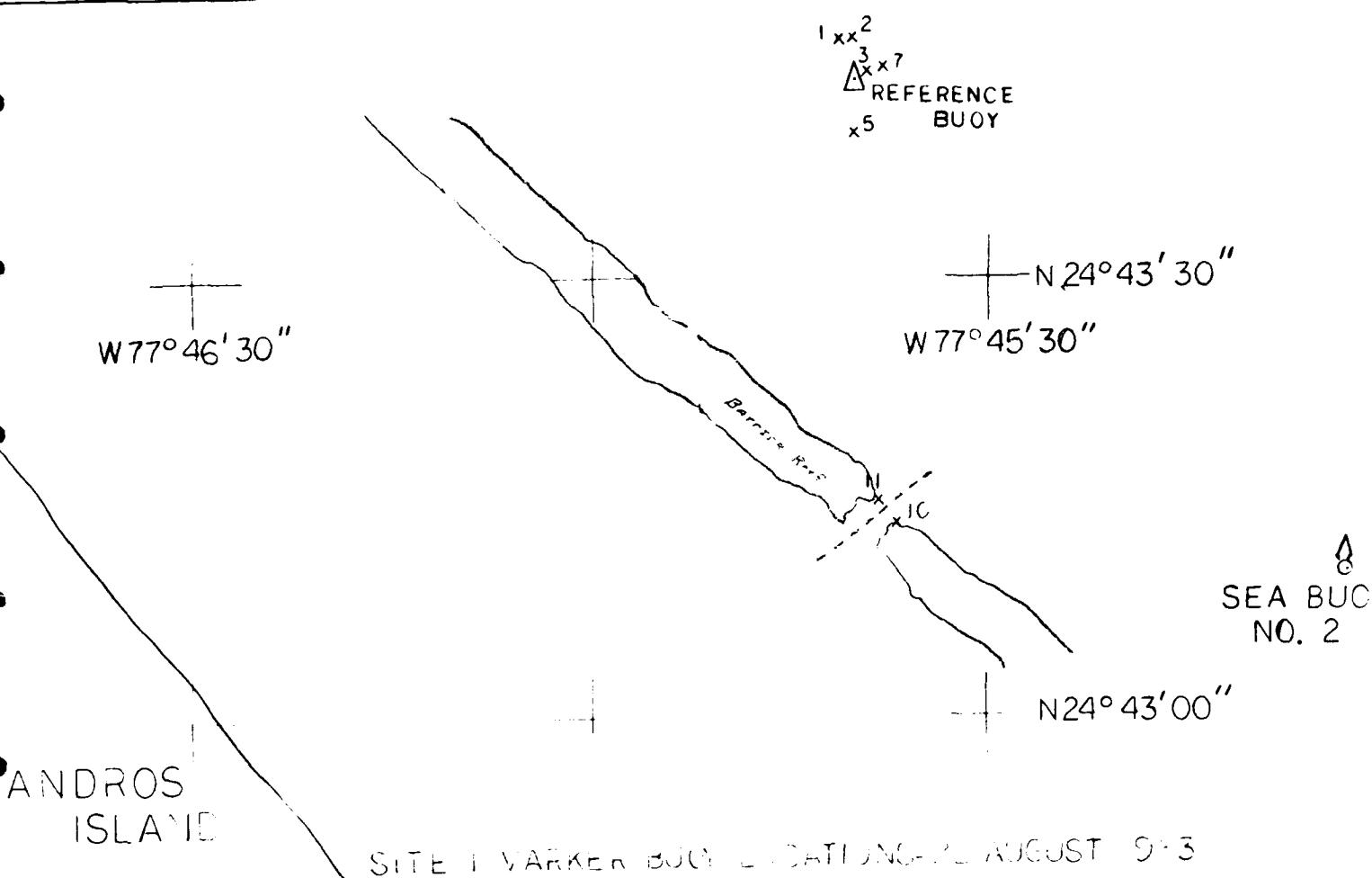
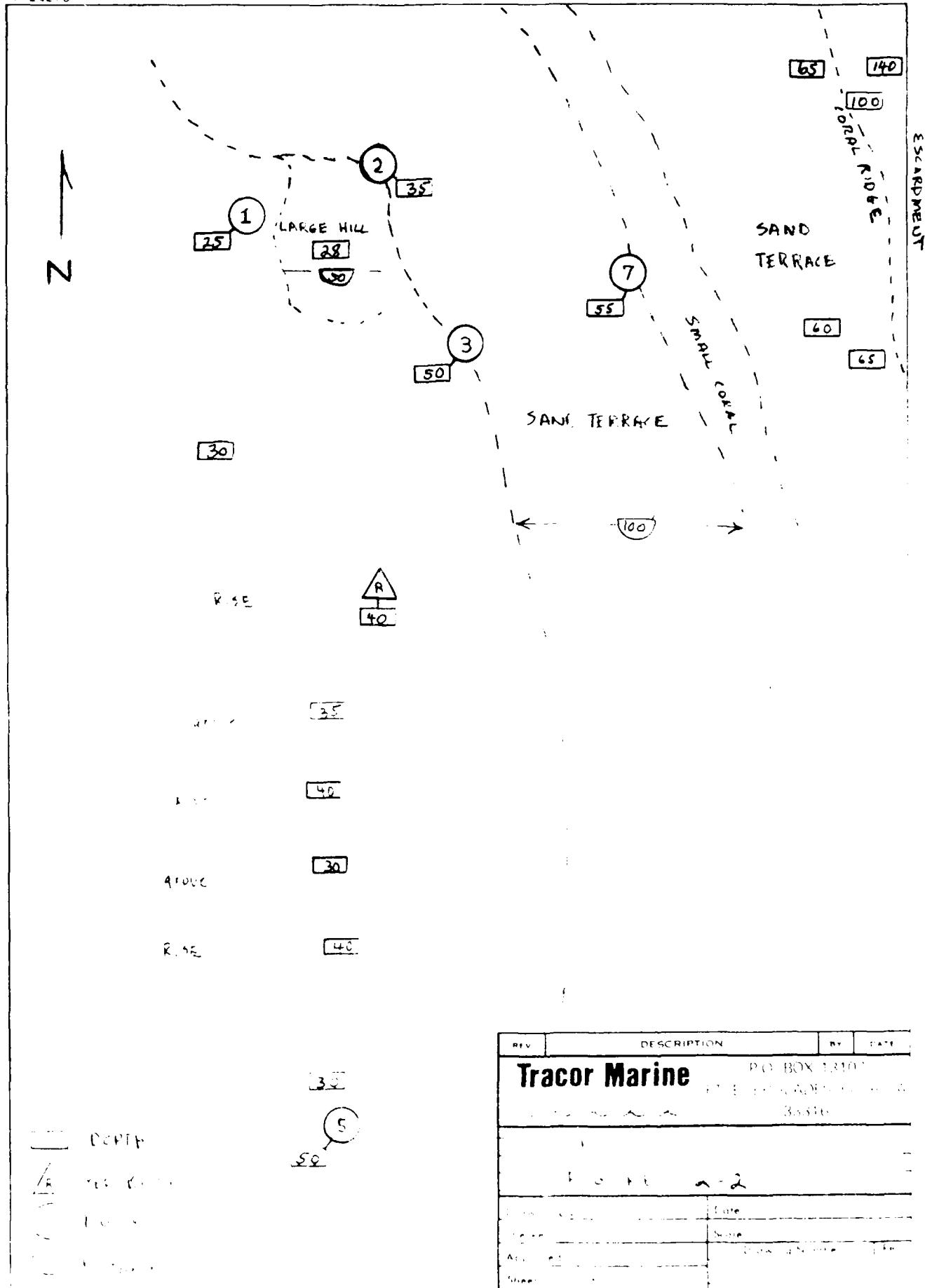


FIGURE 2-1.



REV	DESCRIPTION	BY	DATE
Tracor Marine		P.O. BOX 13101	
		1717 E. 11th Street, Austin, Texas 78701	
		35336	
<p style="text-align: center;">F O R E I G N - 2</p>			
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100
101	102	103	104
105	106	107	108
109	110	111	112
113	114	115	116
117	118	119	120
121	122	123	124
125	126	127	128
129	130	131	132
133	134	135	136
137	138	139	140
141	142	143	144
145	146	147	148
149	150	151	152
153	154	155	156
157	158	159	160
161	162	163	164
165	166	167	168
169	170	171	172
173	174	175	176
177	178	179	180
181	182	183	184
185	186	187	188
189	190	191	192
193	194	195	196
197	198	199	200
201	202	203	204
205	206	207	208
209	210	211	212
213	214	215	216
217	218	219	220
221	222	223	224
225	226	227	228
229	230	231	232
233	234	235	236
237	238	239	240
241	242	243	244
245	246	247	248
249	250	251	252
253	254	255	256
257	258	259	260
261	262	263	264
265	266	267	268
269	270	271	272
273	274	275	276
277	278	279	280
281	282	283	284
285	286	287	288
289	290	291	292
293	294	295	296
297	298	299	300
301	302	303	304
305	306	307	308
309	310	311	312
313	314	315	316
317	318	319	320
321	322	323	324
325	326	327	328
329	330	331	332
333	334	335	336
337	338	339	340
341	342	343	344
345	346	347	348
349	350	351	352
353	354	355	356
357	358	359	360
361	362	363	364
365	366	367	368
369	370	371	372
373	374	375	376
377	378	379	380
381	382	383	384
385	386	387	388
389	390	391	392
393	394	395	396
397	398	399	400
401	402	403	404
405	406	407	408
409	410	411	412
413	414	415	416
417	418	419	420
421	422	423	424
425	426	427	428
429	430	431	432
433	434	435	436
437	438	439	440
441	442	443	444
445	446	447	448
449	450	451	452
453	454	455	456
457	458	459	460
461	462	463	464
465	466	467	468
469	470	471	472
473	474	475	476
477	478	479	480
481	482	483	484
485	486	487	488
489	490	491	492
493	494	495	496
497	498	499	500
501	502	503	504
505	506	507	508
509	510	511	512
513	514	515	516
517	518	519	520
521	522	523	524
525	526	527	528
529	530	531	532
533	534	535	536
537	538	539	540
541	542	543	544
545	546	547	548
549	550	551	552
553	554	555	556
557	558	559	560
561	562	563	564
565	566	567	568
569	570	571	572
573	574	575	576
577	578	579	580
581	582	583	584
585	586	587	588
589	590	591	592
593	594	595	596
597	598	599	600
601	602	603	604
605	606	607	608
609	610	611	612
613	614	615	616
617	618	619	620
621	622	623	624
625	626	627	628
629	630	631	632
633	634	635	636
637	638	639	640
641	642	643	644
645	646	647	648
649	650	651	652
653	654	655	656
657	658	659	660
661	662	663	664
665	666	667	668
669	670	671	672
673	674	675	676
677	678	679	680
681	682	683	684
685	686	687	688
689	690	691	692
693	694	695	696
697	698	699	700
701	702	703	704
705	706	707	708
709	710	711	712
713	714	715	716
717	718	719	720
721	722	723	724
725	726	727	728
729	730	731	732
733	734	735	736
737	738	739	740
741	742	743	744
745	746	747	748
749	750	751	752
753	754	755	756
757	758	759	760
761	762	763	764
765	766	767	768
769	770	771	772
773	774	775	776
777	778	779	780
781	782	783	784
785	786	787	788
789	790	791	792
793	794	795	796
797	798	799	800
801	802	803	804
805	806	807	808
809	810	811	812
813	814	815	816
817	818	819	820
821	822	823	824
825	826	827	828
829	830	831	832
833	834	835	836
837	838	839	840
841	842	843	844
845	846	847	848
849	850	851	852
853	854	855	856
857	858	859	860
861	862	863	864
865	866	867	868
869	870	871	872
873	874	875	876
877	878	879	880
881	882	883	884
885	886	887	888
889	890	891	892
893	894	895	896
897	898	899	900
901	902	903	904
905	906	907	908
909	910	911	912
913	914	915	916
917	918	919	920
921	922	923	924
925	926	927	928
929	930	931	932
933	934	935	936
937	938	939	940
941	942	943	944
945	946	947	948
949	950	951	952
953	954	955	956
957	958	959	960
961	962	963	964
965	966	967	968
969	970	971	972
973	974	975	976
977	978	979	980
981	982	983	984
985	986	987	988
989	990	991	992
993	994	995	996
997	998	999	1000

Figure 2-3 LATITUDE AND LONGITUDE OF SITE 1 BUOYS

SITE # 1

BUOY	DEPTH	DESCRIPTION	LAT.	LONG.	REMARKS
3	50'	50' North-Western Edge of Sand	24° 43' 43.2933"	77° 45' 38.8736	Good Area of Sand
7	55'	East Side of Sand Split	24° 43' 43.8615"	77° 45' 37.5888"	Good Area of Sand
Ref.	40'	Positioned After Previous Survey	24° 43' 43.2403"	77° 45' 39.9693"	Good Area of Sand
2	35'	Sand Patch North East Corner	24° 43' 45.7675"	77° 45' 40.0988"	Buoys Placed on Coral Adj. to Sand
1	25'	Sand Patch South East Corner	24° 43' 45.6554"	77° 45' 40.8005"	Buoys Placed on Coral Adj. to Sand
5	50'	Center of Outcropping	24° 43' 39.4386"	77° 45' 39.9763	Possible Underground Water Source
11	10'	North End of Reef Cut	24° 43' 14.1491"	77° 45' 38.0937"	Cable Route to Shore
10	10'	South End at Reef Cut	24° 43' 13.0235"	77° 45' 36.5662"	Cable Route to Shore



3.0 SURVEY DATE SITE 2

3.1 Scope

The Site 2 survey was conducted in an area approximately $\frac{1}{2}$ mile south of the Site 2 sea buoy. The general area was marked with a surface reference buoy at Latitude $24^{\circ} 29' 24.2049$ N, Longitude $77^{\circ} 41' 53.0062$ W as shown in Figure 3-1. The location of the reference buoy was determined from Trisponder information obtained during a bathymetric survey of the Site 2 area on 8 August, 1983.

The survey was conducted from 23 to 25 August, 1983, using Zodiac inflatable boats with motors. Four scuba divers were used to perform this survey with a Nikonos underwater camera for photo documentation. During the survey, buoys were dropped to mark obstructions and identify the area. Buoys were also anchored to mark the locations of the proposed cable route from the hauldown area through a small cut in the barrier reef to the beach at Site 2. (See Figure 3-2).

At the completion of the survey, a theodolite positioning team from RCA-West Palm Beach, positioned all marker buoys to



determine their latitude and longitude. Three theodolites were used on a 3 mile base line, Figure 3-1.

3.2 Results

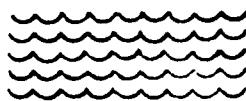
The first dive made at Site 2 was made at the reference buoy. This inspection dive was to survey the general area and to pinpoint what regions might be suitable for the ocean haul-down platform or barge. The 9 August 1983 deep water bathymetric survey had determined a depth of 38 feet at the reference buoy. Diver measurements at the location concluded that the actual depth was 53 feet and determined that the 38 feet reading resulted from the extreme coral relief at this location. The coral heads were tightly spaced, pinnacle shaped buttresses rising as much as 20 feet off the bottom. Diver observations indicate that this bottom type characterized a large area (100 yard radius of the reference buoy) between depths of 40 to 60 feet. The unusual coral growth covered 90 percent of the bottom with the heads separated by narrow meandering sand channels. For at least 150 yards south of the reference buoy, similar rocky heads were observed. However,



50 yards to the north and north east, sand terraces were found. These sand terraces occurred between water depths of 65 and 90 ft. and were most common at 70 ft. Boundaries of the largest and most suitable sand terrace was marked with buoys as shown in Figure 3-2.

The general profile (Figure 3-3) of the surveyed area from west to east consists of a hard coral rock plateau with small heads from the barrier reef to 100 yards west of the reference buoy. The depth of the plateau before the drop off to the deep reef is 25 feet. The deep reef begins after the drop at 45 to 50 feet and continues gradually to 70 feet where the sand terraces begin. The terraces extend from 70 to 90 ft. to the rock ridge or sill. The ridge has a slight rise of coral rock before the start of the 45° slope which extends to 140 feet. At the 140 foot level, the escarpment begins with a very sharp drop off 80°.

Coral types and biotope data may be obtained from the Technical Notes TN 7113-80, NEAR SHORE ECOLOGICAL MONITORING AT AUTEC SITES, U.S. Naval Oceanographic Office, NSTL Station, Bay St. Louis, MS 39522. In general, our survey confirmed the findings of the NSTL Reports.



Upon completion of the deep water survey, a tentative cable route was surveyed. A small cut in the barrier reef was found and is noted on the Site 2 marked buoy locations shown in Figure 3-2. This is the shortest possible route from the reference buoy area to Site 2. The reef cut was located during an aerial survey using the Autec Helicopter and subsequently confirmed by diver observation.

Figure 3-4 gives latitude and longitude of all buoys placed at Site 2 including reference buoy. This chart presents water depth and a description of the bottom at each buoy location.

ANDROS ISLAND

W77°43'00"

+

SITE 2

x²¹

x²²

x²³

x²⁴

x²⁵

x²⁶

x²⁷

x²⁸

x²⁹

x³⁰

x³¹

x³²

x³³

x³⁴

W77°42'00"

—+—N24° 30' 00"



SEA BUOY NO. 2

N

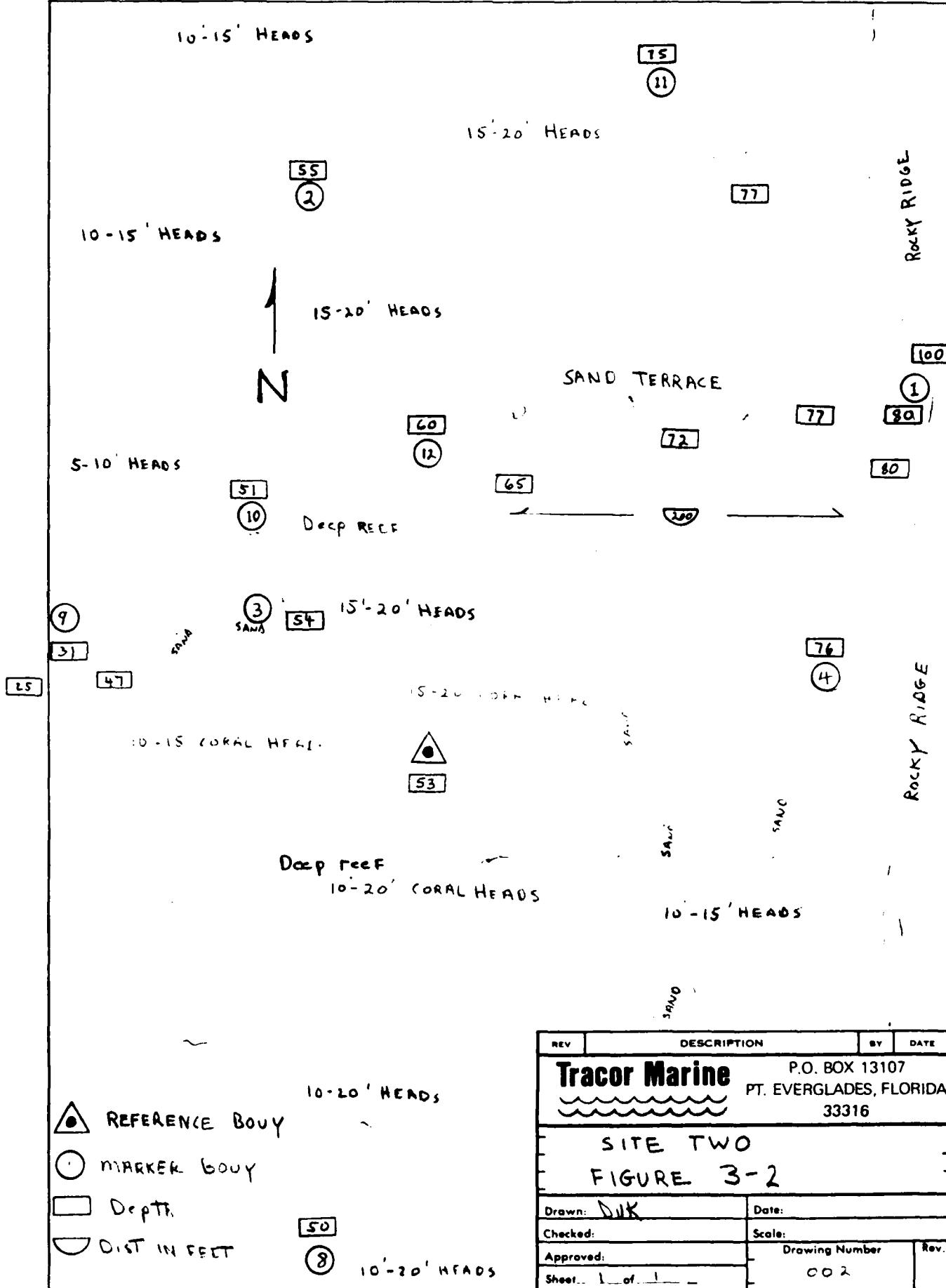
N24° 29' 30"

CUT BARRIER REEF

11
10
12
09
08
07
06
05
04
03
02
01

REFERENCE
BUOY

SITE 2 MARKER BUOY LOCATIONS - 15 AUGUST 1970



REFERENCE BOUYS

1

MARKER BOY

1

Dept.

1

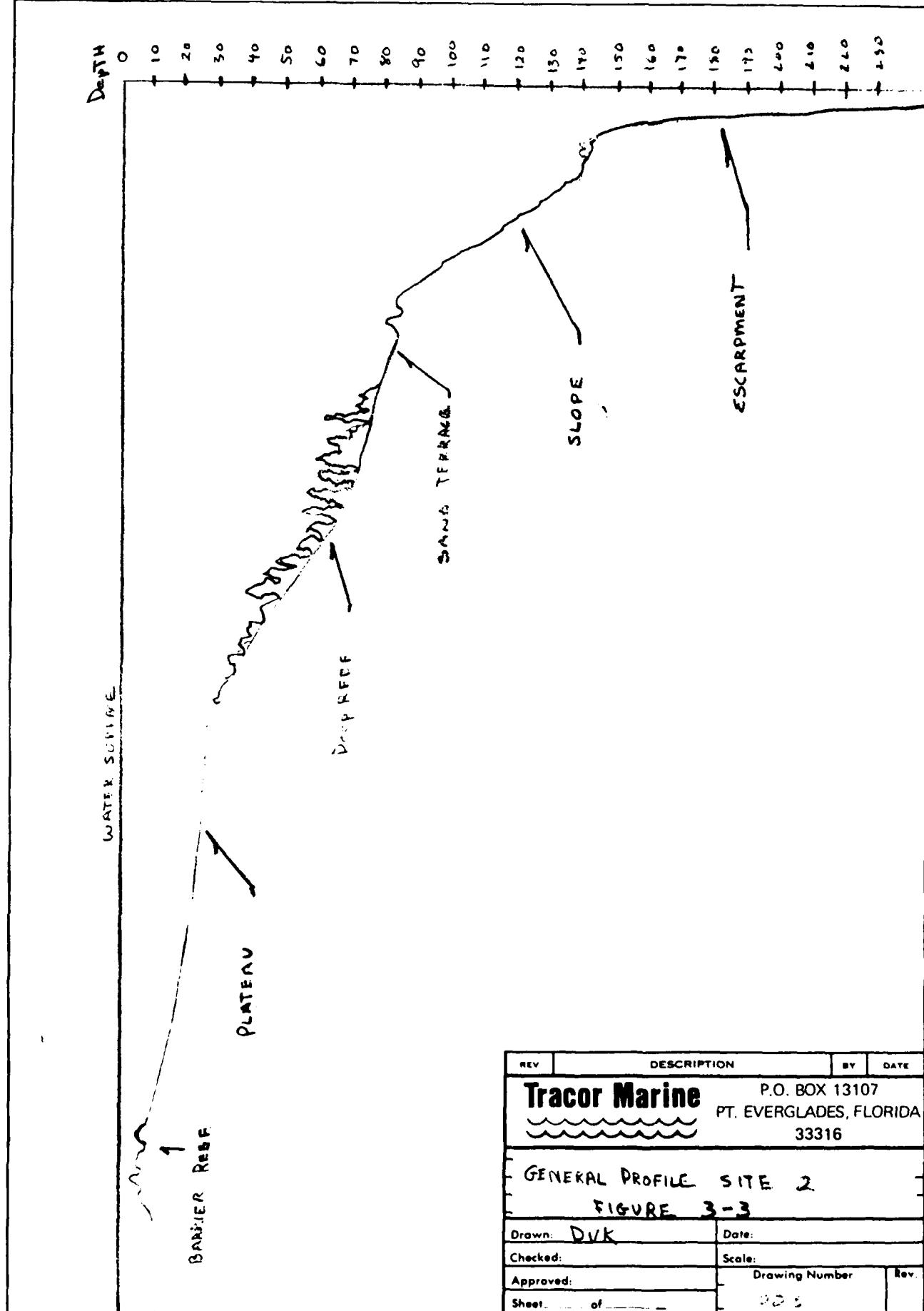
DIST IN FEET

10-20' HEADS

50

10'-20' MFAOS

REV	DESCRIPTION	BY	DATE
		P.O. BOX 13107 PT. EVERGLADES, FLORIDA 33316	
SITE TWO FIGURE 3-2			
Drawn:	DJK	Date:	
Checked:		Scale:	
Approved:		Drawing Number	Rev.
Sheet:	1 of 1	002	



REV	DESCRIPTION	BY	DATE
Tracor Marine P.O. BOX 13107  PT. EVERGLADES, FLORIDA 33316			
GENERAL PROFILE SITE 2 FIGURE 3-3			
Drawn:	DVK	Date:	
Checked:		Scale:	
Approved:		Drawing Number	Rev.
Sheet	of	205	

Figure 3-4 LATITUDE AND LONGITUDE OF SITE 1 Buoys

SITE # 1

BUOY	DEPTH	DESCRIPTION	LAT.	LONG.	REMARKS
Ref.	53'	Reference Buoy	24° 29' 24.2049	77° 41' 53.0062	Coral Head Area 15'-20' Heads
08	50'	Southern Edge of Survey	24° 29' 21.4852	77° 41' 53.9332	Coral Head Area 15'20' Heads
04	76'	Southern Edge of Sand Terrace	24° 29' 25.1053	77° 41' 51.4300	Sand 12" Deep
01	80'	Eastern Edge of Sand Terrace	24° 29' 26.9216	77° 41' 51.0754	Start of Rocky Ridge Drop Off
11	75'	North Edge of Sand Terrace	24° 29' 28.0099	77° 41' 52.3022	Edge Coral Head 10'-15' Heads
02	55'	North West Edge of Survey	24° 29' 27.6589	77° 41' 54.7335	Coral 10'-15' Heads
12	60'	Western Edge of Sand Terrace	24° 29' 26.5619	77° 41' 53.3505	Edge of Coral Head 10'-15' Heads
03	54'	Center Sand Patch	24° 29' 25.5343	77° 41' 54.7574	Patch 20' x 30' Edge 10'-20' Heads
10	51'	Deep Reef	24° 29' 26.0192	77° 41' 54.8186	10' - 20' Heads
09	31'	Slope From Plateau	24° 29' 25.5063	77° 41' 56.1718	20° Slope Small Heads
31	12'	South West Corner B. Reef Cut	24° 29' 28.1890	77° 42' 10.5769	1'-2' Small Coral Heads
30	9'	Flats Coral Patch	24° 29' 30.9904	77° 42' 15.3889	1'-2' Small Coral Heads
29	11'	Grass Flats	24° 29' 32.6166	77° 42' 19.1649	Grass, Sand
28	11'	Grass Flats	24° 29' 34.6985	77° 42' 23.7950	Grass, Sand
27	10'	Flats	24° 29' 36.0448	77° 42' 27.8235	Grass, Sand
26	11'	Flats	24° 29' 37.5203	77° 42' 31.9558	Grass, Sand
25	12'	Flats	24° 29' 39.4516	77° 42' 36.0293	Grass, Sand
24	12'	Flats	24° 29' 40.8326	77° 42' 39.9934	Grass, Sand
23	10'	Flats	24° 29' 42.6959	77° 42' 44.6336	Grass, Sand
22	10'	Flats	24° 29' 44.2053	77° 42' 48.8276	Grass, Sand
21	8'	Flats	24° 29' 46.8991	77° 42' 54.8739	Grass, Sand
34	15'	Plateau	24° 29' 26.5460	77° 42' 00.1883	Small Coral 2'-3' Heads
33	14'	Plateau	24° 29' 17.4447	77° 42' 05.0156	Small Coral 2'-3' Heads
17	8'	North East Corner B. Reef Cut	24° 29' 29.1001	77° 42' 07.0954	North Edge of Coral Patch
12	8'	South East Corner B. Reef Cut	24° 29' 28.0467	77° 42' 07.4819	South Edge of Coral Patch
16	10'	North West Corner B. Reef Cut	24° 29' 28.7091	77° 42' 10.2995	North Edge of Coral Patch

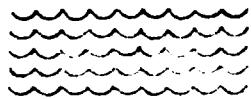
4.0 CONCLUSIONSite 1

The bottom conditions around the reference buoy at Site 1 were very typical. The deep reef was made up of scattered heads with a maximum relief of 4-6 ft. Sand trenches (grooves) running east and west between the coral spurs diminished seaward where the sand terraces begin. The first photograph in the photograph section (page 1) shows the sand grooves. They are also shown on page 4. The sand terraces shown in photographs on page 1 and page 3 were large and extended from approximately 40 ft. to 65 ft. where the rocky ridge begins. Coral spurs (rises between grooves) are shown in numerous photographs pages, 1, 2, 3, 4. Page 6 gives a good view on the rocky ridge where the slope to 140 ft. level begins. No major obstructions were found during the dive survey at Site 1.

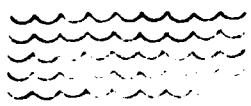
Site 2

Bottom conditions around the reference buoy at Site 2 were not typical. The reference buoy anchor clump, shown in photograph one, page 7, is wedged in coral heads approximately 10 ft. off the bottom. The deep reef consisted of very large pinnacle shape buttresses extending from the plateau drop off 45' to

Tracor Marine



approximately 70 ft. of water. These large heads are shown in photographs on pages 7, 8, 9 and 10. The sand terraces, pages 11 and 12 were in deep water 70 ft. to 90 ft and only one large terrace was found. The rocky ridge, page 13, was similar to the ridge at Site 1, however, the coral heads were larger. From the reference buoy directly in line with the Site 2 dock, a small reef cut was found and marked with buoys. Pages 15 and 16 show the bottom condition in this area.



5.0 PERSONNEL

Site 1

- o Dennis V. Kembro - Project Manager/Dive Master
- o Len Gordon - Project Engineer/Diver
- o Richard Counter - Diver

Site 2

- o Dennis V. Kembro - Project Manager/Dive Master
- o Len Gordon - Project Engineer/Diver
- o Richard Counter - Diver
- o Rob Munier - Diver (Program Manager)

6.0 GENERAL LOGSunday, August 21st

1300 - Arrived West Palm Beach
1500 - Arrived AUTEC
1530 - Arrived Buoy
1600 - Assembled equipment and filled tanks
1700 - Chow
1800 - Secured for day

Monday, August 22nd

0600 - Dived.
0630 - Load dive gear and filling tanks.
0745 - Commenced dive survey Site 1
 Diving at buoy and marking obstructions.
1500 - Began position fixes on buoys.
1745 - Arrived at dock. Survey complete
1830 - Secure for day.

Tuesday, August 23rd

0530 - Chow
0700 - Departed Site 1 for Site 2

Tracor Marine

Wednesday, August 23rd

0530 - Arrived at Site 1.

0600 - Set up land equipment.

0700 - Determined site of interest.

0800 - Arrived at buoy and marking obstructions.

1000 - Chow

1400 - Marking obstructions and taking photographs

1700 - Secured for day

Wednesday, August 24th

0530 - Chow

0745 - Arrived at Site 2

0800 - Loaded dive gear

0830 - Continued survey of Site 2.

1000 - Started setting buoys to shore

1830 - Secured for day

Thursday, August 25th

0530 - Chow

0730 - Departed Site 1 for Site 2

0830 - Arrived Site 2

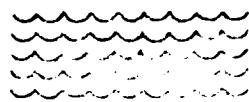
1000 - Began position fixes on buoys

1330 - Completed positioning.

1400 - Chow

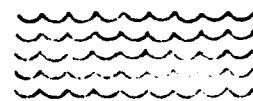
1730 - Back at Site 1. Secured for day.

Tracor Marine



Friday, August 26th

0700 - Chow
0800 - Unloaded equipment at Site 1
0900 - Started packing equipment for shipment
 to West Palm Beach.
1100 - Chow
1400 - Departed AUTEC
1500 - Arrived West Palm Beach



7.0 DIVE EQUIPMENT AND MATERIAL

Since the maximum depth was approximately 100 feet, scuba equipment was used for this survey.

Equipment List, Site 1

10 scuba tanks

2-12' Zodiacs with motors

Site 1's 16 foot RAR boat with motor

30 concrete blocks (anchors)

1200' $\frac{1}{4}$ " poly line

50 lobster floats

U/W measuring tape

Nikonos II 35mm underwater camera, 200ASA, normal lens

Mako scuba compressor

Divers personnel gear.

Equipment List, Site 2

10 scuba tanks

2-12' Zodiacs with motors

Site 1's 20' Zodiac with motor

25 concrete blocks (anchors)

800' $\frac{1}{4}$ " poly line

30 lobster floats

U/W measuring tape

Nikonos II 35 mm underwater camera, 200ASA, normal lens

Mako scuba compressor

Divers personnel gear

NE 1/4 Buoy 7 55'

SITE 1

TOP OF LARGE HILL 30'
NE 1/4 Buoy SITE 1

SAND TERRACE East of
Buoy 7

Buoy 5 30' SITE /
MURRAY APPROX 6' LONG

NEAR LARRY E HILL
SEE FIG 2-2 35' SITE /

Buoy 3 area 35'
SPAWN SITE /

NEAR LARRY HILL 30'
SEE FIG 2-1 SITE /

SITE 1 RISE BUOY REF.
INCAD REF BUOY 40'

SITE 1 RISE LOOKING AT
SAND TERRACE FROM BUOY 3

RISE BUOY 5 30'
SITE 2

EDGE OF SAND TERRACE
NEAR BUOY 3

SITE 1 Rocky Ridge 65'
its a drop off to 140'

Looking at 140' ledge
Drop off after ledge SITE 1

on sand terrace
down to Buoy 2

Near Buoy 2 on Rocky Ridge
Diver at 70' going down slope site 2

1075' Buoy 3 35' SITE 1
NURSE SHARK ON BOTTOM 4

AREA Buoy 3 42' SITE 1

ARENA NAME: Buoy # 2
Rock Ridge 65' SITE 1

LINE UP EAST Buoy # 1
STAND FIRACCE BEFORE COXAL REVERSE
SITE 1

ROCK & 2 LINE UP
STAND FIRACCE BEFORE COXAL REVERSE
SITE 1

ROCK & 2 LINE UP
STAND FIRACCE BEFORE COXAL REVERSE
SITE 1

SITE 2 NEAR REF BUOY
ANCHOR 10' DEPTH 53'

SITE 2 REF Buoy chain

SITE 2 NEAR REF BUOY
ANCHOR 10' DEPTH 53'

SITE 2 Looking South of
REF Buoy

RECEIVED
LIBRARY OF
THE UNIVERSITY OF TORONTO LIBRARIES
REF BISON S1112

2. MELT IT REF BLOW

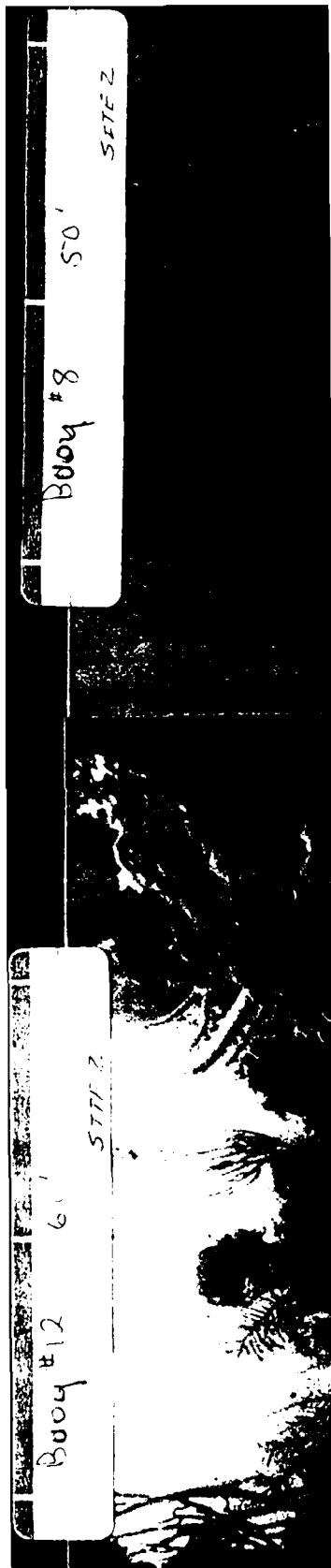


Image 812 LOOKING EAST
INTERFACETE IN DISTANCE SITE 2

KIT 1 UC

Image 813 LOOKING EAST
INTERFACETE IN DISTANCE SITE 2

KIT 1 UC

Image 814 LOOKING NORTH
INTERFACETE IN DISTANCE SITE 2

KIT 1 UC

EAST OF BUON #12 EN 6E OF
LAKE SAND TRAPACE 65'

BUON 3 54'

SITE 2

BUON 10 51'

DATE OF SAND TERRACE
D...
D...

P 11

EAST BUOY 12 70' SITE 2
EAST SIDE LARGE SAND TERRACE

SAND TERRACE LOOKING SITE 2
TO BUOY # 1 77'

BUOY #1 LOOKING WEST
SC SITE 2

BUOY # 1 SITE 1

SITE 2

PORT Buoy 1 100'
located down slope SITE 2

PORT Buoy 1 100'
located down slope SITE 1

EAST OF Buoy # 1 SITE 2
located down slope 100'

NE of Buoy # 12, SITE 2
SAND TERRACE 65',
25'

Buoy 3 54'
Buoy 3 SITE 2

Pictures Buoy # 9
25', 25'

SITE 2

Buoy 4 South

25'

J

BUOY 32 Location S-11h

STL 2

Center of small cut
Between 31 + 7 Size 2

BUOY 28 Size 2

BUOY 27

Size 2

Buoy 4
Locating Buoy 4
NORTH

Buoy 4
Locating Buoy 4
NORTH

SITE 2

Buoy 6
Locating Buoy 6
NORTH

SITE 2

Buoy 31

SITE 2

SITE 2

E N D

D T C

8 - 86